SAMS-FF Data Recording During the STS-107 Mission
AOS and LOS Data Combined with Additional Playbacks
(April 21 through May 1, 2003)

SAMS-FF Description

The Space Acceleration Measurement System for Free-Flyers (SAMS-FF) provides tri-axial accelerometers used to measure the vibratory/transient portion of the overall Space Transportation System (STS) microgravity environment in support of the microgravity scientific community. Vibratory/transient accelerations are composed of disturbances that originate in STS equipment, scientific experiment, and crew operations. The vibratory/transient accelerations are on the order of a milli-g.

For STS-107, the SAMS-FF had three accelerometers actively collecting data and all three sensors were located within the Spacehab module. However, due to downlink limitations, only one accelerometer's data was actively downlinked. All accelerometer data was recorded on the SAMS-FF Control and Data Acquisition Unit (CDU). The accelerometer that was downlinked consisted of data recorded at 100 samples per second over the nominal frequency range 0.1-25 Hz. Data are stored in units of g.

This report describes the SAMS-FF data set that was downlinked and recorded on the ground during Acquisition of Signal (AOS) periods when the Spacehab Experiment Ground Data Apparatus (EGDA) was functioning properly and the SAMS-FF ground systems were configured to receive data. It also includes LOS data obtained during the mission from the Spacehab data systems. A third data set was obtained during playbacks that occurred between April 21, 2003 and May 1, 2003. This third data set was used to fill in any "holes" in the data that still existed following the merger of the AOS and LOS data sets.

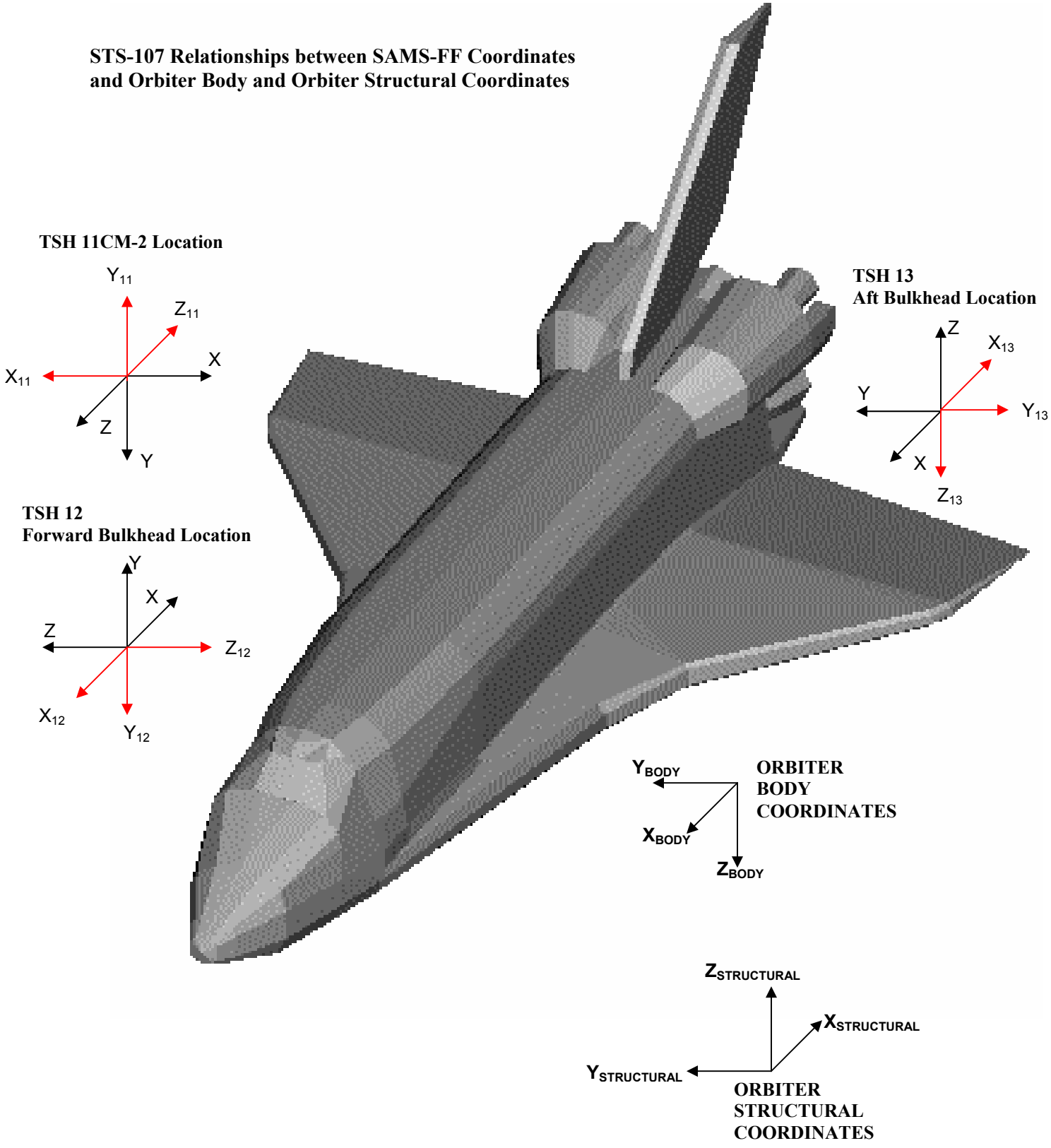
The Spacehab EGDA experienced problems throughout the STS-107 mission that resulted in some loss of AOS data. SAMS-FF was flown to support specific scientific investigations that did not start their operations until around MET 006. Consequently, the SAMS-FF staff supporting the STS-107 mission was only on console recording acceleration data via ground support equipment 16 hours per day until those science operations began. When the SAMS-FF staff was not on console to support their equipment, the ground support equipment was not configured to receive any acceleration data. Consequently, any AOS data transmitted during these time periods were not recorded.

The SAMS-FF sensor that was downlinked is the sensor Triaxial Sensor Head 11 (TSH) located at the Combustion Module-2 location.

SAMS-FF Coordinate System

The SAMS-FF sensors were oriented as follows relative to the Orbiter structural coordinate system. The direction from nose to tail of the orbiter is +X in the Orbiter structural coordinate system. The direction from the port wing to the starboard wing is +Y in the Orbiter structural coordinate system. The direction from the Orbiter belly to

out the top of the Orbiter fuselage is +Z in the Orbiter structural coordinate system. The data provided are stored in the Orbiter structural coordinate system.



Data Availability

The SAMS-FF data begins at GMT 16-January-2003, 016/22:26 and the final SAMS-FF data ends at GMT 31-January-2003, 031/22:52. SAMS-FF 24 hour support started at MET 006 and ended after MET 010. Table 1 through Table 16 provide GMT and MET times for data gaps in the raw SAMS-FF data that are greater than 10 minutes in duration. The SAMS-FF data provided is stored with a GMT time reference and can be obtained via FTP at the following location:
ftp://pims.grc.nasa.gov/SAMSFF/

The color code in the tables tries to address the suspected cause of the data gaps that remain, despite all playbacks that have occurred.

1. **Data loss unexplained**
2. **EDMSU problems**
3. **Downlink head switched to sensor SAMSFF_13 at MET 001/01:33-04:28**
4. **SAMS CDU problems**

The total time missing from all these gaps is 1344 minutes. These represent the gaps present in the data for the SAMSFF sensor head SAMSFF_11. The loss of a total of 463 minutes is unexplained (see note 1). A total of 556 minutes were lost due to EDMSU problems (see note 2). SAMSFF_13 was being downlinked for 182 minutes of the total 1344 minutes of missing data (see note 3). A total of 143 minutes were lost due to SAMSFF CDU problems (see note 4).

SAMSFF was actively collecting acceleration data from sensor SAMSFF_11 for approximately 15 days and 23 minutes (21623 minutes). The table below summarizes the data loss versus the cause.

Cause of Lost Data	Minutes Lost	Percent of Total Mission
Unexplained	463	2.14
EDMSU Problems	556	2.57
SAMSFF_13 Downlinked	182	0.84
SAMS CDU Problems	143	0.66
Total:	***1344***	***6.21***

SAMS-FF Data File Contents

Each SAMS-FF binary data file contains four columns stored in little-Endian format (4 byte floating point numbers): time, x-axis acceleration, y-axis acceleration, and z-axis acceleration. The time column is a relative time to the time embedded in the beginning portion of the filename. For the SAMS-FF data file,

2003_01_25_00_38_56.101-2003_01_25_00_45_56.091.samsff11

The time column is relative to **2003_01_25_00_38_56.101.** Add the time column value to this time to get the actual time for a particular record.

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Table 1 – SAMS-FF Data Gaps MET 000

MET Gap Start Time	MET Gap Stop Time	GMT Gap Start Time	GMT Gap Stop Time
000/09:24:38	000/10:13:38	017/01:03:38	017/01:52:38
000/10:38:38	000/12:14:38	017/02:17:38	017/03:53:38
000/23:27:38	000/23:49:38	017/15:06:38	017/15:28:38

Table 2 - SAMS-FF Data Gap MET 001

MET Gap Start Time	MET Gap Stop Time	GMT Gap Start Time	GMT Gap Stop Time
001/00:40:39	001/01:15:39	017/16:19:39	017/16:54:39
001/01:31:39	001/04:33:39	017/17:10:39	017/20:12:39
001/09:06:39	001/09:18:18	018/00:45:39	018/00:57:18
001/19:07:39	001/19:25:17	018/10:46:39	018/11:04:17
001/20:34:39	001/20:49:39	018/12:13:39	018/12:28:39
001/23:59:39	002/01:39:41	018/15:38:39	018/17:18:41

Table 3 – SAMS-FF Data Gaps MET 002

MET Gap Start Time	MET Gap Stop Time	GMT Gap Start Time	GMT Gap Stop Time
002/16:22:41	002/16:40:41	019/08:01:41	019/08:19:41
002/18:27:41	002/18:42:17	019/10:06:41	019/10:21:17
002/20:59:41	002/21:12:41	019/12:38:41	019/12:51:41
002/22:35:41	002/22:48:41	019/14:14:41	019/14:27:41

Table 4 - SAMS-FF Data Gaps MET 003

MET Gap Start Time	MET Gap Stop Time	GMT Gap Start Time	GMT Gap Stop Time
003/02:05:43	003/02:48:43	019/17:44:43	019/18:27:43
003/13:42:43	003/14:14:43	020/05:21:43	020/05:53:43

Table 5 - SAMS-FF Data Gaps MET 004

MET Gap Start Time	MET Gap Stop Time	GMT Gap Start Time	GMT Gap Stop Time
004/05:32:44	004/06:00:44	020/21:11:44	020/21:39:44

Table 6 - SAMS-FF Data Gaps MET 005

MET Gap Start Time	MET Gap Stop Time	GMT Gap Start Time	GMT Gap Stop Time
005/01:24:46	005/02:03:46	021/17:03:46	021/17:42:46
005/05:40:46	005/09:25:46	021/21:19:46	022/01:04:46

Table 7 - SAMS-FF Data Gaps MET 006

MET Gap Start Time	MET Gap Stop Time	GMT Gap Start Time	GMT Gap Stop Time
006/00:48:47	006/00:59:18	022/16:27:47	022/16:38:18
006/05:17:47	006/05:49:47	022/20:56:47	022/21:28:47
006/18:20:47	006/18:37:47	023/09:59:47	023/10:16:47
006/21:33:47	006/21:47:47	023/13:12:47	023/13:26:47

Table 8 - SAMS-FF Data Gaps MET 007

MET Gap Start Time	MET Gap Stop Time	GMT Gap Start Time	GMT Gap Stop Time
007/21:57:49	008/00:20:56	024/13:36:49	024/15:59:56

Table 9 - SAMS-FF Data Gaps MET 008

MET Gap Start Time	MET Gap Stop Time	GMT Gap Start Time	GMT Gap Stop Time
008/22:25:56	008/22:50:56	025/14:04:56	025/14:29:56

Table 10 - SAMS-FF Data Gaps MET 009

MET Gap Start Time	MET Gap Stop Time	GMT Gap Start Time	GMT Gap Stop Time
NO	*GAPS*	*WERE*	*FOUND*

Table 11 - SAMS-FF Data Gaps MET 010

MET Gap Start Time	MET Gap Stop Time	GMT Gap Start Time	GMT Gap Stop Time
010/19:24:58	010/20:45:58	027/11:03:58	027/12:24:58

Table 12 - SAMS-FF Data Gaps MET 011

MET Gap Start Time	MET Gap Stop Time	GMT Gap Start Time	GMT Gap Stop Time
011/06:30:00	011/07:07:02	027/22:09:00	027/22:46:02
011/08:35:00	011/10:20:00	028/00:14:00	028/01:59:00

Table 13 - SAMS-FF Data Gaps MET 012

MET Gap Start Time	MET Gap Stop Time	GMT Gap Start Time	GMT Gap Stop Time
012/11:22:02	012/11:42:02	029/03:01:02	029/03:21:02

Table 14 - SAMS-FF Data Gaps MET 013

MET Gap Start Time	MET Gap Stop Time	GMT Gap Start Time	GMT Gap Stop Time
013/11:49:03	013/12:13:03	030/03:28:03	030/03:52:03
013/18:29:03	013/19:07:03	030/10:08:03	030/10:46:03

Table 15 - SAMS-FF Data Gaps MET 014

MET Gap Start Time	MET Gap Stop Time	GMT Gap Start Time	GMT Gap Stop Time
014/06:11:04	014/06:29:04	030/21:50:04	030/22:08:04
014/07:15:04	014/07:33:04	030/22:54:04	030/23:12:04

Table 16 - SAMS-FF Data Gaps MET 015

MET Gap Start Time	MET Gap Stop Time	GMT Gap Start Time	GMT Gap Stop Time
NO	*GAPS*	*WERE*	*FOUND*